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PREPARATIONS FOR THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT ON THE BASIS OF GENERAL ASSEMBLY RESOLUTION 44/228 AND TAKING INTO ACCOUNT OTHER RELEVANT GENERAL ASSEMBLY RESOLUTIONS: CROSS-SECTORAL ISSUES

Conservation of biological diversity

(Section II, Chapter 7, of Agenda 21)

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. The present document has been prepared in response to Preparatory Committee decision 3/18. It takes into account the proposals submitted by Governments in the light of that decision. The proposals are reproduced in full in document A/CONF.151/PC/108, which is before the Preparatory Committee at its present session. The format of the present document is based on the

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* See A/CONF.151/PC/96.

guidance provided by the Preparatory Committee on the structure of Agenda 21, as contained in its decision 3/2. Text that has been extracted verbatim from part II of document A/CONF.151/WG.I/L.28/Rev.1 is contained within double asterisks and the symbols ‹ › and referenced. Text derived from part II of document A/CONF.151/WG.I/L.28/Rev.1 is contained only within the symbols ‹ › accompanied by a short explanatory note.

2. The variety and variability of genes, species, populations and ecosystems on our planet provides an abundant and essential supply of indispensable goods and services. As the basis of our sustenance, they provide our food and fibre needs and many of our medicines. Biodiversity exists in farmers' fields, forests, savannahs, deserts, tundras, rivers and the seas. Gene banks, botanical gardens and zoos contain a small part of this biodiversity. (Derived from paras. 3 and 4) ‹Resolving the most critical problem for the conservation of biodiversity will require a major shift in thinking at all levels of decision-making, supported by a commitment to stepping up levels of human, financial and other resources, especially for capacity-building in the developing countries. The programme areas below are designed to mobilize, build upon and coordinate current activities to address the many gaps and weaknesses, and to assist the Preparatory Committee in determining priorities for further work. They are intended to complement and reinforce the work of the Intergovernmental Negotiating Committee for a Convention on Biological Diversity (INC), and to assist in the implementation of a convention.› 1/ (Derived from para. 7) ‹As an integrated strategy to save, study and use biological resources to promote sustainable development, they should be implemented as a package:

(a) Providing information on biodiversity;

(b) Maximizing and spreading the benefits of biodiversity;

(c) Improving the conservation of biological diversity and wildlife;

(d) Enhancing the capacity to manage biological resources, including wildlife.›

(Derived from para. 9) ‹ Notes 2-5 explain the background and aims of the document, and the links between biodiversity and other environmental and developmental issues.› The present chapter is closely related to chapters 3 (Combating deforestation), 6 (Promoting sustainable agriculture and rural development), 8 (Environmentally sound management of biotechnology) and 9 (Protection of oceans ...) of section II, and to chapter 9 (Providing data and information for sustainable development) of section IV.

3. The estimated average annual cost of the programme areas in the present chapter during the period 1993-2000 is expected to be about US$ 5 billion. The estimated average annual cost of strengthening international organizations to assist countries to conduct programmes is expected to be about US$ 30 million. At the time of preparation, there was no reliable material on the global costs of conserving biodiversity. It is expected that relevant

information will emerge through the INC process, especially in the light of the country studies exercise. In the meantime, the estimates in this chapter have been based on the best available advice. Conserving biological diversity is a global environmental issue. Pending the outcome of the INC process, the estimated costs of each programme area have been arbitrarily divided equally between national Governments - supported as appropriate by non-governmental organizations, local communities and others - and the international community.

II. PROGRAMME AREAS

A. Providing information on biodiversity

1. Basis for action

4. (Derived from (para. 10)‹ Major gaps and weaknesses exist in the capacity of existing national and international mechanisms to assess, study and monitor biological resources, including micro-organisms. More effective approaches are required to understand the status of existing species and ecosystems, the distribution, variation patterns, economic uses, biology and genetics of priority species, and their relationships. This will involve studying indigenous uses of biological resources, the role of women and the rights acquired through selection practices by traditional farmers (farmers' rights). This is especially important if economic values are to be ascribed to enable biodiversity to be fully integrated into economic and related policy-making at every level. Assessment, study and monitoring processes need to be open to public scrutiny and the results widely disseminated. More scientific research is required to assess the status and extent of biodiversity at the species and other levels and to evaluate its role in the functioning of ecosystems, particularly in sustaining ecosystem services, such as soil and water conservation, as well as in supporting sustainable economic activities and development.› Major knowledge gaps exist, especially concerning:

(a) **(Para. 11 a)‹ Biological implications of possible global climate change, notably the relationship of ecosystem structures and functions to overall atmospheric and hydrological processes at the global and regional level;›**

(b) **(Para. 11 b)‹ The effective protection and maintenance of varieties, species, populations, and communities, in representative ecosystems;›**

(c) (Derived from para. 11 c)‹ The sustainable management of landscapes and ecosystems, taking account of social, environmental and all other costs and benefits;›

(d) (Derived from para. 11 d)‹ The role of diverse soil organisms and other micro-organisms in maintaining the productivity of agricultural and other ecosystems;›

(e) The role of traditional resource management and use practices in the maintenance of biodiversity.

2. Objectives

5. (Derived from para. 13)‹ The following objectives, synchronized for maximum speed and effectiveness, should be pursued without delay, building wherever possible upon existing or planned activities. The overall aim is to provide a sound scientific basis for formulating policies for biodiversity. Since the major part of the work involved will need to be undertaken in developing countries, adequate support should be provided to them for this and for their participation in regional and global efforts:›

(a) (Derived from para. 13 a)‹ By the year [1995] ensure that work is in hand on national surveys of their biota and initiate a coordinated global survey to establish baseline assessments of biodiversity;›

(b) (Derived from para. 13 b)‹ Develop a global monitoring system, building upon existing national and international mechanisms, to be completed by the year [2010];›

(c) (Derived from para. 13 c)‹ By the year [1995] install programmes to evaluate the role of biodiversity in the functioning of the world's major ecosystems and landscapes and in securing sustainability in food production systems.›

3. Activities

(a) Management-related

6. (Derived from paras. 14 and 15) As a tool for management at local and national levels, national Governments, with the cooperation of relevant intergovernmental and non-governmental organizations, and appropriate agencies of the United Nations, should undertake national surveys to establish baseline information on their biological resources, including terrestrial, aquatic, coastal and marine. On this basis, a sampling survey of the world's biota to estimate biodiversity should be coordinated by the United Nations system. This programme area embraces specific activities such as:›

(a) (Derived from para. 14 b)‹ Develop, test and make available cost-effective methodologies for scientific and economic inventories of biological resources, including their genetic variation, and for rapid assessments of biodiversity;›

(b) (Derived from para. 14 c)‹ Undertake statistical sampling of biological resources and assessment of genetic variation, in selected areas by multidisciplinary teams;›

(c) (Derived from para. 15 a)‹ Identify and develop the use of biogeographic units for the conservation of biodiversity;›

(d) (Derived from para. 14 f)‹ Evaluate the potential economic implications of the protection and sustainable use of identified elements of biodiversity in each country, building upon country studies undertaken by the United Nations Environment Programme (UNEP) and research undertaken in cooperation with indigenous and local communities on traditional practices; ›

(e) (Derived from para. 14[b])‹ Develop the basis for a sampling survey of the world's biodiversity, initially in a limited number of countries, by coordinating and harmonizing existing and planned activities such as the UNEP Global Environmental Monitoring System, the international Biosphere Reserve Network of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Global Information and Early Warning System on Plant Genetic Resources of the Food and Agriculture Organization of the United Nations (FAO) and other relevant programmes.›

(b) Data and information

7. (Derived from para. 15)‹ As a basis for information, the international community in general should establish a global system for monitoring quantitative and qualitative changes in biodiversity and to provide early warning information, with the collaboration of national Governments and institutions, and intergovernmental and non-governmental organizations, under the guidance of appropriate United Nations organizations and building upon local knowledge and existing mechanisms, incorporating the following and other specific activities:›

(a) **(Para. 14 a)‹ Consolidate existing information on biodiversity and make it widely available throughout government and to the public;›**

(b) (Derived from para. 15 d)‹ Collate information on sustainable use of ecosystems and on changes in biodiversity, based on traditional knowledge at the grass-roots level, with support from scientific teams;›

(c) **(Para. 15 b)‹ Identify and harmonize appropriate methodologies and main data elements for monitoring the status and condition of different habitats, using remote-sensing techniques, geographic information systems and cartographic methods as appropriate;›**

(d) (Derived from para. 15 c)‹ Develop a network of ground stations for inventorying biodiversity and monitoring changes in ecosystems, using where appropriate the potential offered by the international Biosphere Reserve Network, including the calibration and validation of remote-sensing monitoring.›

(c) International and regional cooperation and coordination

8. (Derived from para. 16)‹ Major and long-term research should be undertaken into the importance of biodiversity for the functioning of ecosystems and on the role of ecosystems in producing goods, environmental services and other values supporting sustainable economic activities and development. Research should include the following areas: biology and reproductive capacity of key plant species; new observation and inventory techniques; ecological conditions necessary for biodiversity conservation and continued evolution; and social behaviour and nutrition habits where there is a direct dependence on natural ecosystems and where women play an important role in ensuring food security. This work should be undertaken at the national and local levels, with the participation of indigenous peoples, non-governmental organizations, research institutions, universities, and appropriate programmes and organizations of the United Nations, and should include:›

(a) (Derived from para. 14 d)‹ Input information into a computerized biodiversity information system, building upon existing facilities such as the World Conservation Monitoring Centre, and provide assessments on a regular basis;›

(b) (Derived from para. 16)‹ Evaluate the ecosystem function of biodiversity, building on the International Union of Biological Sciences (IUBS) Scientific Committee on Problems of the Environment (SCOPE)/UNESCO programme in this field, and make available the information for development planning, design of protected areas, education and training.›

4. Means of implementation

(a) Financing and cost evaluation

9. The estimated average annual cost of this programme for the period 1993-2000 is expected to be upwards of US$ 200 million per annum, which is arbitrarily divided equally between national Governments and the international community, pending the outcome of the INC process. The estimated average annual cost of strengthening international organizations to assist countries to conduct this programme is expected to be about US$ 3 million.

(b) Scientific and technological means

10. (Derived from para. 14 e)‹ Substantial scientific and technological demands will be made, particularly in the fields of taxonomy, genetics, assessments and surveys using modern technologies such as geographical information systems, data management, and the preparation of information for policy makers.› The aim must be to collect, assess and present relevant and reliable information in a timely manner and in a form suitable for managers and decision makers at all levels, with the full support and participation of voluntary efforts at the grass-roots level.

(c) Human resource development

11. Highly trained taxonomists and other scientists, including those responsible for operating advanced computerized and remote-sensing systems for developing monitoring and assessment methods, will be required. Priority should be given to building up the number of trained personnel at all levels in these fields in the developing countries. The training of young specialists in data collection in the field, and in the management of information on biodiversity, as well as in communicating this information to policy makers, should receive special attention.

(d) Capacity-building

12. Existing institutions and repositories of information (such as museums, herbaria and universities) should be more adequately staffed and funded for better and more integrated documentation on biodiversity. New institutional mechanisms, such as national biodiversity institutes or centres, should be developed to assess the species richness of countries and their economic value. Regional mechanisms equipped with adequate data handling and communication technology are also needed, and links established with such facilities as the World Conservation Monitoring Centre. Attention should be given to supporting field projects and to centres that can collate and transfer traditional knowledge on biodiversity.

B. Maximizing and spreading the benefits of biodiversity

1. Basis for action

13. (Consolidated from paras. 17, 18, and 19)‹ Biological resources constitute a capital asset with a potentially enormous sustainable yield of benefits. However, to date the institutions and financial and human resources devoted to conservation and sustainable use of these resources have been inappropriate or inadequate. Furthermore, national policies and market practices and mechanisms too frequently either fail to provide incentives to conserve and use biodiversity sustainably or even facilitate the depletion of species and the degradation of ecosystems. National income accounting systems equate activities resulting in biological resource depletion with net income, which is then reflected in the design of sector-specific activities and projects. For biodiversity to be recognized as an important economic asset, methods are needed to enable the direct and indirect values of species of forests, savannahs, grasslands, wetland areas, coastal and marine ecosystems, and the genetic diversity of agricultural plant and animal species to be quantified.

14. (Derived from para. 19 a)‹ Recent advances in biotechnology, and the development of powerful new information technologies, have underlined the potential for agricultural, industrial, environmental, health and welfare purposes of the genetic material contained in plants, animals and micro-organisms. The conservation and sustainable use of these genetic

resources (including any profits resulting from biotechnology products) offers opportunities for international cooperation between developed and developing countries, as well as among developing countries.› See programme areas A and C of chapter 8 for the relevant aspects of biotechnology, as well as programme areas B (Protecting forests: promoting afforestation and reforestation) and C (Promoting a better utilization and value of trees, forests and forest lands) of chapter 3, programme areas G (Conservation and utilization of plant genetic resources for sustainable agriculture) and H (Conservation and utilization of animal genetic resources for sustainable agriculture) of chapter 6, and programme area A (Integrated management and sustainable development of coastal areas, exclusive economic zones and [marine ecosystems]) of chapter 9.

2. Objectives

15. (Derived from para. 21)‹ Efforts need to be concentrated as follows. They should wherever possible build upon existing or planned activities:›

(a) (Derived from para. 21 a)‹ Develop local, national and international policies› which ensure that the actual and potential benefits and profits deriving from biodiversity, particularly in the sustainable use of certain of its components, is recognized, maximized, and shared among all those concerned;

(b) Promote the utilization of related local technologies and modern biotechnologies for the conservation and sustainable use of biological resources;

(c) (Derived from para. 21 b)‹ Broaden the economic and social base for halting the loss of biodiversity by sharing the responsibility for conservation throughout society, especially within the industrial and economic sectors, and through non-governmental organizations and local and indigenous communities, especially farmers, women and children;›

(d) **(Para. 21 c)‹ Develop a supportive framework of international agreements, funding mechanisms, and institutional capacity;›**

(e) Define and implement sustainable use projects aimed at providing alternatives to unsound biodiversity exploitation.

3. Activities

16. (Derived from para. 22)‹ National Governments (from both developed and developing countries) <u>should incorporate national commitments on the conservation of biodiversity into their development policies</u>. Intergovernmental organizations and international development and financial organizations should call for such commitments to be made. Biodiversity considerations need to be taken into account in policies relating to financial resources, technology transfer, debt, trade, environmental accounting, and the

use of economic instruments (each of which is addressed in other chapters). (Derived from para. 22 d)‹ This will involve developing a process for meaningful and constructive dialogue among all the groups involved in improving biodiversity policy, including both conservers and users.› Specific activities should include the following:

(a) Management-related:

(i) (Derived from para. 22 a)‹ Provide maximum support and reinforcement for the negotiation, implementation and observance of relevant existing or proposed international instruments, 6/ with particular reference to a convention on biological diversity;›

(ii) (Derived from para. 22 b)‹ Review and reform national and international policies, agreements and trade practices which provide incentives for the unsustainable use of biological resources;›

(iii) **(Para. 22 f)‹ Develop national biodiversity strategies or action plans as part of wider economic planning, elaboration of legislation, and allocations of new and additional funding from national and international sources;›**

(iv) Provide mechanisms to enable indigenous peoples and local communities to conserve and manage ecosystems, as part of environmentally sound development;

(v) (Consolidation of paras. 29 e and 30 c)‹ Promote mechanisms to enable the participation of local communities, including farming communities, in the formulation and implementation of national plant and animal genetic resources programmes, with emphasis on the in situ conservation of indigenous crops, wild relatives of cultivated plants, and domesticated animals and their centres of origin;›

(vi) Review and reform national and international policies to promote the application of the relevant aspects of biotechnology and local technologies for the conservation and sustainable use of genetic resources;

(vii) Apply the relevant aspects of biotechnology for the sustainable utilization of genetic resources. 7/

(b) Data and information:

(i) **(Para. 22 c)‹ Develop a methodological framework for ascribing economic values and for quantifying the contribution of biological resources and ecosystem functions to national economies;›**

(ii) **(Derived from para. 22 g)‹ Increase significantly the level of support for research into the use of genetic resources, especially for national crop and livestock breeding programmes, as well as for pharmaceutical products (including those provided by traditional medicine, in cooperation with local communities).›

(c) International and regional cooperation and coordination:

(i) (Derived from para. 22 h)‹ Agree on international procedures for collection and transfer of biological resources, including genetic material, recognizing rights of the State, indigenous peoples, communities and individuals, including those of women, and the concept of farmers' rights, as identified in the International Undertaking on Plant Genetic Resources;›

(ii) Undertake cooperative research on the use of relevant aspects of biotechnology for the sustainable utilization of genetic resources.

4. Means of implementation

(a) Financing and cost evaluation

17. The estimated average annual cost of this programme for the period 1993-2000 is expected to be about US$ 550 million, which is arbitrarily divided equally between national Governments and the international community, pending the outcome of the INC process. The estimated average annual cost of strengthening international organizations to assist countries to conduct this programme is expected to be about US$ 5 million.

(b) Scientific and technological means

18. Considerable technological research will be required for developing techniques for the sustainable use of biological resources, particularly regarding the relevant aspects of biotechnology. Imaginative approaches in economics, sociology and cultural anthropology will also be called for. Steps will also need to be taken to (derived from para. 22 l)‹ encourage transnational corporations to assist with spreading the benefits of biodiversity and the relevant aspects of biotechnology to developing countries›. Mechanisms for the management of hunting and gathering systems, including fisheries, should be developed to prevent the loss of biodiversity through over or inappropriate exploitation practices.

(c) Human resource development

19. It will be necessary to step up programmes aimed at training specialized personnel and increasing awareness of the complex issues relating to biodiversity, especially at the top policy- and decision-making levels within Governments, transnational corporations, lending institutions and banks.

(d) Capacity-building

20. Governments, transnational corporations, lending institutions, banks and multilateral and bilateral development agencies should (derived from para. 22 e) ‹build capacity to integrate biodiversity concerns, potential benefits and opportunity cost calculations into project design, implementation and evaluation processes, as well as environmental impact assessments and structural adjustment processes.› Extension programmes, involving farmers and local and indigenous communities, will also be needed. (Derived from para. 22 i) ‹ Existing international funding mechanisms will need to be strengthened or new initiatives taken necessary to meet developing country needs.› (Consolidated from paras. 22 k and j) ‹The use of trust funds and endowments by national Governments, lending institutions and non-governmental organizations, and of private and public debt-for-nature swaps which respect fully the wishes of indigenous peoples and traditional communities inhabiting the areas concerned, also needs to be encouraged.›

C. Improving the conservation of biological diversity and wildlife

1. Basis for action

21. (Consolidated from paras. 23, 24 and 25)‹ Despite mounting efforts over the past 20 years, the loss of the world's biodiversity has continued. Currently, the most effective way to conserve biodiversity is through in situ protection of ecosystems, enabling interaction among individuals and populations of the same and different species within ecosystems. Ex situ conservation of genetic resources is complementary to in situ conservation and should be closely linked to it. In situ conservation can be achieved through different forms of ecosystem management. As this may mean the reduction or abandonment of certain activities, protecting biological resources can represent high opportunity costs to some sectors of society, with particularly adverse implications for developing countries. The conservation of biodiversity thus calls for programmes embracing in situ protection of ecosystems; ex situ conservation of genetic resources; enhancement of ecosystem functions; and alleviation of demographic pressures on concerned and surrounding areas, all with the full support of local populations. Application of the relevant aspects of biotechnology is one of the tools available for the conservation of biodiversity. Some basic elements of an institutional framework for conserving microbial, plant and animal genetic resources are already in place at community, national, regional and global levels. However, they are hampered by a serious lack of funds and a need for improved institutional structures and implementation mechanisms at all levels.› (See programme areas A and C of chapter 8, programme area B of chapter 3, and programme areas G and H of chapter 6.)

2. Objectives

22. (Derived from para. 27)‹ This programme area should, wherever possible, build upon existing or planned activities:›

(a) (Derived from para. 27 a)‹ Consolidate, strengthen and expand systems of protected areas to cover an appropriate portion of each biogeographic unit of the globe, including coastal areas, by the year [2000];›

(b) (Derived from para. 27 b)‹ Strengthen conservation measures to prevent the extinction of species and varieties of particular value or critically important to humankind by the year [2000];›

(c) (Derived from para. 27 c)‹ Promote regional approaches to the conservation of biodiversity;›

(d) (Derived from para. 27 d)‹ Promote a sustainable balance between demographic pressures, social and economic use of resources and natural ecosystems;›

(e) Promote production systems, such as traditional methods of agroforestry and range management, which utilize, maintain or increase biodiversity.

3. Activities

23. (Derived from para. 28)‹ The activities set out below should be implemented by national Governments, with the collaboration of intergovernmental and non-governmental organizations and international financial and lending institutions, and with the guidance of relevant organizations and programmes of the United Nations system.›

(a) (Derived from para. 29 a)‹ Increase the size of the global network of terrestrial protected areas so that all areas identified as important for biodiversity within each biogeographic province of the earth's land surface are included;›

(b) (Derived from para. 29 b)‹ Expand, develop and coordinate regional programmes to identify vulnerable coastal ecosystems (terrestrial and marine) and to establish coastal protected areas, including representative wetland areas, estuaries, coral reefs and mangroves, by the year [2000].›

(a) Management-related

(i) (Derived from para. 29 g)‹ Develop effectively managed and financially sound national systems of protected areas to conserve biodiversity and manage wildlife;›

(ii) (Derived from para. 29 f)‹ Develop national and local policies, both regulatory and economic, to encourage the management of private lands as protected areas;›

(iii) (Derived from para. 29h)‹ Support non-governmental organizations and private land owners, in particular women, farmers and indigenous people, who manage key sites for biodiversity outside protected areas;›

(iv) Support appropriate reintroduction efforts undertaken by local communities;

(v) (Derived from para. 30 j)‹ Apply the relevant aspects of biotechnology for the conservation of biodiversity;› 8/

(vi) (Derived from para. 30 k)‹ Develop means to protect biological communities from the impact of invasive and exotic plants and animals;›

(vii) (Derived from para. 31 e)‹ Restore degraded landscapes to enhance both their productivity and their biodiversity;›

(viii) Promote the conservation and sustainable utilization of wildlife through the development of game ranching activities.

(b) Date and information

(i) **(Para. 30 a)‹ Evaluate the implications of intellectual property rights on conservation and sustainable use of biodiversity at local, national, and global levels;›**

(ii) (Derived from para. 29 i)‹ Conduct socio-demographic and behaviourial science studies into the impact of people on protected areas.›

(c) International and regional cooperation and coordination

(i) (Derived from para. 31 d)‹ Strengthen and improve the Biosphere Reserves Network of UNESCO in terrestrial, aquatic and coastal areas, to link conservation zones with surrounding ecosystems and landscapes and provide economic and social benefits to their inhabitants;›

(ii) (Derived from para. 30 e)‹ Develop a global plan of action for the collection, evaluation, preservation, documentation and enhancement of plant genetic resources for sustainable advances in crop productivity;›

(iii) (Derived from para. 30 g)‹ Take action to ensure that globally important collections of genetic resources of all groups of organisms are conserved and made accessible;›

(iv) Take steps at national and regional levels to establish and maintain sufficiently large reserves to ensure the viability of threatened populations of wild animals.

4. Means of implementation

(a) Financing and cost evaluation

24. The estimated average annual cost of this programme for the period 1993-2000 is expected to be about US$ 3 billion, which is arbitrarily divided equally between national Governments and the international community, pending the outcome of the INC process. The estimated average annual cost of strengthening international organizations to assist countries to conduct this programme is expected to be about US$ 16 million.

(b) Scientific and technological means

25. Special skills and knowledge will be required for the planning and management of multifunctional areas for in situ conservation, as well as high-level technology for ex situ conservation. For in situ conservation methods, there is a need for communication, negotiation and planning skills, for example in establishing protected areas in coastal regions where demographic and economic pressures are greatest. Such skills will also be required (derived from para. 31)‹ for linking protected areas with surrounding landscapes to enhance ecosystem functions. Protected core areas should, wherever possible, be surrounded by buffer zones and transition areas utilized to enhance the social and economic opportunities for local communities, which can be the best wardens of their biodiversity.› Certain programme activities will require specialized scientific expertise, such as the restoration of degraded landscapes and ecosystems; population biology for the management of wildlife, animal and plant genetics; breeding and propagation programmes of rare species and related reintroduction into the wild; and quarantine and regulatory methods for controlling invasions. Considerable technological research will be required for developing techniques for the conservation of biodiversity, particularly regarding the relevant aspects of biotechnology.

(c) Human resource development

26. Numbers of trained personnel will need to be built up in the planning and management of multifunctional areas for in situ conservation and for the establishment and running of ex situ facilities such as gene banks. There is an acute lack of such specialists in the developing countries, where the needs and opportunities for them are greatest.

(d) Capacity-building

27. Governmental institutions responsible for the planning and management of national parks, biosphere reserves and the like and for the development and maintenance of, for example, conservatories and gene banks need to be given a

considerable boost in funding and staffing to undertake the programme activities. These institutions need to enhance their capacity for intersectoral coordination and planning with other governmental institutions, with non-governmental organizations and with indigenous communities. Special legal and technical measures will need to be taken to enforce legislation, regulations and codes of conduct required to implement the programme activities.

D. Enhancing the capacity to manage biological resources, including wildlife

1. Basis for action

28. There is a pressing need to strengthen and build up institutional capacities for research into and management of biological resources. (Derived from para. 32)‹ Knowledgeable and adequately trained personnel are needed to implement even current levels of conservation and sustainable use of biodiversity, particularly in developing countries. Training institutions and teaching approaches are insufficient, inadequate and often irrelevant. Job opportunities in this field are limited by the shortage of institutions, and many positions are poorly paid and supported. This needs to be rectified as a matter of urgency. Raising the level of awareness among local people as custodians of biological diversity would enable them to exercise their rights and responsibilities more effectively in protecting and sustainably utilizing those resources.›

2. Objectives

29. (Derived from para. 33)‹ This programme area has five main aims:›

(a) (Derived from para. 33 a)‹ To strengthen and, as appropriate, decentralize existing national and local institutional capacities (including academic institutions) to support and manage the conservation and sustainable use of biological resources, and to link the conservation of biodiversity for economic development;›

(b) (Derived from para. 33 b)‹ To promote basic and applied research and demonstrations to improve the management of protected areas and increase their effectiveness in conservation of biodiversity, particularly through appropriate development in surrounding areas;›

(c) (Derived from para. 33 c)‹ To train effective managers of protected areas and wildlife, personnel for planning and running ex situ institutions, land resources managers and specialists responsible for policy formulation;›

(d) **(Para. 33 d)‹ To raise the level of awareness of the general public, local populations and decision makers;›**

(e) (Derived from para. 33 e)‹ To develop appropriate economic and financial mechanisms at national and international levels for the management of biological resources.›

3. Activities

30. (Derived from para. 34)‹ National Governments and institutions, with the collaboration of appropriate organizations and programmes of the United Nations and non-governmental organizations, should build upon existing or planned activities.›

(a) Management-related

(i) Undertake education at all levels to create a deeper understanding of the importance of biodiversity and to develop professional skills, drawing upon the traditional knowledge of diverse cultures;

(ii) (Consolidation of paras. 34 d and f)‹ Launch and strengthen existing training programmes to record and monitor biodiversity and to improve planning and management of national and regional genetic resources programmes;›

(iii) **(Para. 34 e)‹ Develop coordinated graduate and post-graduate research programmes on biodiversity and ecosystems function in protected areas, including biosphere reserves and coastal ecosystems;›**

(iv) (Derived from para. 34 m)‹ Develop education programmes aimed at creating a wider awareness of the role of ex situ conservation, primarily among agricultural and other relevant scientists and managers;›

(v) (Derived from para. 34 g)‹ Strengthen training institutions for protected area and wildlife management and establish new centres in the regions where they do not exist;›

(vi) (Derived from para. 34 h)‹ Launch specialized technical professional training programmes to develop expertise in various aspects of ex situ management such as germ plasm collection, isolation and culture of micro-organisms, documentation, evaluation, and sustainable use;›

(vii) (Derived from para. 34 k)‹ Establish programmes of field training and, where appropriate, laboratory training for specialists in taxonomy, genetics and conservation biology;›

(viii) (Derived from para. 34 l)‹ Establish extension courses and services for local communities and encourage their participation in promoting the use of natural resources on a sustainable basis;›

(ix) (Derived from para. 34 i)‹ Strengthen institutional capacities, including gene banks and laboratories, for research into the relevant aspects of biotechnology;›

(x) **(Para. 34 a)‹ Develop public administrations for protected area management and encourage the creation of supportive non-governmental organizations at the national level;›**

(xi) (Derived from para. 34 c bis)‹ Develop appropriate local institutions and financial and other mechanisms to enable indigenous people and local communities to manage biodiversity using traditional approaches, recognizing the special role of women, and including the development of education and awareness programmes designed by and for those groups;›

(xii) (Derived from para. 34 n)‹ Use protected areas for practical outdoor training purposes, by demonstrating how they function, drawing upon the knowledge and employment of indigenous peoples, as appropriate;›

(xiii) (Derived from para. 34)‹ Launch a number of large-scale regional interdisciplinary projects in different parts of the world to demonstrate the sustainable use of biological resources and to strengthen local and national capacities to manage them;

(xiv) (Consolidation of paras. 29 c and d)‹ Take measures to enable local communities to earn benefits from protected areas, including revenue enhancement and appropriate development within buffer zones;›

(xv) (Derived from para. 30 d)‹ Strengthen existing facilities and develop improved technologies for reducing deterioration of genetic resources during storage, improving regeneration capabilities and reintroducing threatened species into the wild;›

(xvi) (Derived from para. 30 i)‹ Strengthen support for botanical gardens, culture collections of micro-organisms, insectaries, germ plasm banks, conservatories and biodiversity centres which are contributing to the conservation of threatened wild animals and plants and their reintroduction.›

(b) Data and information

(Para. 34 c)‹ Collect and document traditional knowledge and skills in resource use to pass on to future generations.›

(c) International and regional cooperation and coordination

(i) **(Para. 29 j)‹ Strengthen and broaden existing international and regional instruments to conserve biodiversity;›**

(ii) (Derived from para. 30 b)‹ Strengthen the legal and institutional framework for the global conservation and sustainable use of plant genetic resources, including the establishment of an intergovernmental body, possibly building upon the FAO Commission on Plant Genetic Resources, the Consultative Group on International Agricultural Research, or other international bodies;›

(iii) (Derived from para. 30 f)‹ Develop a global network of genetic resource centres, with a view to future adaptation of populations to changing environmental conditions, including pests, diseases, climate change and atmospheric pollution;›

(iv) (Derived from para. 34 b)‹ Develop and strengthen regional and international cooperation on protected area systems;›

(v) (Derived from para. 34 j)‹ Promote national and regional professional associations of biodiversity conservation and protected areas managers, including biosphere reserve managers and other stakeholders, for exchange of experience and information;›

(vi) (Consolidation of paras. 31 a, b, and c)‹ Plan and implement cooperative regional management programmes in areas critical for their biodiversity value, including coastal and marine ecosystems, such as by means of the regional seas approach of UNEP.›

4. Means of implementation

(a) Financing and cost evaluation

31. The estimated average annual cost of this programme for the period 1993-2000 is expected to be about US$ 1 billion, which is arbitrarily divided equally between national Governments and the international community, pending the outcome of the INC process. The estimated average annual cost of strengthening international organizations to assist countries to conduct this programme is expected to be about US$ 8 million.

(b) Scientific and technological means

32. General environmental education will be required to heighten awareness on biodiversity issues, as well as specialist training techniques and curricula for extension courses, for enabling local communities to use their local biological resources and ecosystems sustainably, and for technicians responsible for the planning and management of centres for both in situ and ex situ conservation of biodiversity. There is a particular need for training teachers of taxonomy, population genetics and conservation biology, as well as for the study of management methods relating to multifunctional conservation areas.

(c) Human resource development

33. There is a need to train locally the various kinds of managers and professionals required by developing countries to ensure the conservation and sustainable use of their biological resources. In this process, special attention will need to be given to training the trainers.

(d) Capacity-building

34. The challenge is to strengthen and build up management procedures and institutional capacity for managing biological resources. The ability of developing countries to assimilate additional financial resources will be critical to the success of the four programme areas in this chapter. Unless and until a radical but progressive build-up of institutional and procedural capacities at all levels in those countries can be brought about, the implementation of many of the activities within the integrated package presented in the four programme areas of this chapter is likely to be severely constrained. This will need to be combined with strengthening and expanding environmental education and specialist training facilities to develop human resource capacities. New national and regional training facilities for the management of in situ conservation areas will need to be envisaged. Training and research facilities will also need to be strengthened with regard to the relevant aspects of biotechnology. Governments will need to ensure that their decision-making and administrative structures enable them to plan and implement their activities and programmes for the conservation and sustainable use of their biological resources.

Notes

1/ The priority areas for costing and funding under the prospective convention were given in UNEP/Bio.Div/Guidelines (May 1991) as follows:

(a) Surveys, inventories, identification and authentication of biological diversity;

(b) Technical assistance and cooperation for research, training and education, public awareness campaigns, surveys and inventories;

(c) Management strategies and plans for in situ conservation of biodiversity;

(d) Regular monitoring of the status of the world's biodiversity;

(e) Coordination of conservation management strategies and plans with sustainable development policies;

(f) Priority conservation projects;

(g) Needs of existing legal instruments on biodiversity;

(h) Transfer of technology, including biotechnology etc.

Notes (continued)

2/ Conservation aims of the programme areas (Consolidation of paras. 7 and 9).

The programme areas in the present chapter can be more fully defined as follows:

(a) Providing information on biodiversity

Developing more effective procedures and programmes for assessing, studying and monitoring biological diversity and wildlife to assist planning and decision-making;

(b) Maximizing and spreading the benefits of biodiversity

Developing and applying policies for realizing the potential benefits and sustainable utilization of biological resources, including genetic resources;

(c) Improving the conservation of biological diversity and wildlife

Strengthening and augmenting ongoing activities for conserving biological resources, including wildlife;

(d) Enhancing the capacity to manage biological resources, including wildlife

Building up the educational, training and institutional framework and economic and financial mechanisms for the conservation and sustainable utilization of biological resources, including wildlife.

The objectives of the programme areas include the following:

(a) To integrate biodiversity considerations fully into national and international policy-making and decision-making;

(b) To stop the depletion of biological and genetic resources;

(c) To promote sustainable development through the sustainable use of biological resources;

(d) To establish a global programme [by the year 1995] to ascertain the extent of the earth's biological resources;

(e) To endeavour to reduce the risk that human activities will cause long-term adverse effects upon natural ecosystem processes.

3/ Links between biodiversity and development (Derived from para. 5)

Success or failure in achieving the aims listed in note 1 will have major repercussions on the development process. With the exception of mineral

Notes (continued)

extraction, all primary producing sectors depend heavily on a continuing and plentiful supply of biological resources. The conservation of biodiversity, especially genetic diversity within species, could be one key to the world's food security through improved crop production, horticultural and animal husbandry techniques, and aquaculture. Society also benefits from the use of wild plants and animals for shelter and as raw materials for pharmaceutical products, industry and energy. In their turn, the activities of the primary producing sectors have a major influence on the stock of biological resources. As the techniques for attaching economic values to those resources and for incorporating them into national accounting processes evolve, their key role in the international economy seems likely to become increasingly evident. The maintenance of ecosystems functions, in particular for soil and water conservation, is based on the careful management of their biological resources and plays a fundamentally important role in maintaining environmental quality. As an integral component of ecosystems, biodiversity provides the capacity for ecosystems to adapt to changing environmental conditions in the future.

4/ Links between biodiversity and other issues (Derived from para. 6)

There are major cross-linkages between biodiversity and the following issues:

(a) Climate change (including drought), with particular reference to possible changes in the distribution of species and habitats, could contribute to genetic erosion and losses of biological resources vital to human welfare. It also threatens the viability of certain protected areas, though it might possibly enrich or enhance other habitats;

(b) Forests, especially tropical forests, act as habitats for much of the world's terrestrial biodiversity, and diminution of their size and quality can affect a wide range of environmental ecosystem functions and services, as well as local climates;

(c) Oceans and coastal areas, including the land-sea interface, represent areas of high biodiversity, endemism, variability and recruitment, contributing to the regulation of greenhouse gases, the supply of food, and the protection of coastal areas, including coral reefs, coastal vegetation systems and mangroves;

(d) The relevant aspects of biotechnology, in which traditional new and improved techniques for preserving and utilizing genetic resources will play a key role in food security, human health and welfare, and industrial processes, and which is based on biodiversity;

(e) Land resources, in which diversity of soil organisms plays an important function in maintaining the fertility of the soil for agriculture as well as for natural ecosystems;

Notes (continued)

(f) Freshwater, in which the diversity of biological resources may offer a significant potential for developing improved freshwater species for meeting many human needs;

(g) Population and social dynamics exert pressures on numerous natural ecosystems, reducing habitats and contributing to the loss of biological and genetic resources, which in turn diminish the resource base to provide for human needs; at the same time, the traditional knowledge of indigenous populations is often the most appropriate way to conserve biodiversity and to use biological resources on a sustainable basis;

(h) Environmental education, where the study of the varied functions of biodiversity is often an important starting point.

5/ In preparing the present document, the Conference secretariat has continued to work closely with the relevant organizations of the United Nations system and with other members of the informal ad hoc Working Party on Biodiversity, whose expert advice and helpful support has been gratefully received. Particularly useful contributions were received from the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme, the United Nations Educational, Scientific and Cultural Organization, the International Board for Plant Genetic Resources, the secretariat of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, the World Bank, the United Nations Development Programme, the United Nations Industrial Development Organization, the International Union for Conservation of Nature and Natural Resources (IUCN), the World Resources Institute (WRI) and the Indigenous People's Commission, as well as from the International Union of Biological Sciences, the International Mycological Institute, Genetic Resources Action International, and the Keystone Centre. The work of other intergovernmental and non-governmental organizations such as the Consultative Group on International Agricultural Research, Conservation International and the World Wide Fund for Nature was also taken into account. The document draws upon the work being undertaken for the Global Biodiversity Strategy under the joint auspices of UNEP, IUCN and WRI, as well as upon a number of other plans and programmes.

6/ Existing relevant instruments include:

Convention concerning the Protection of the World Cultural and Natural Heritage, 1972

Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973

Convention on Wetlands of International Importance Especially as Waterfowl Habitat, 1971

Notes (continued)

Convention on the Conservation of European Wildlife and Natural Habitats, 1979

Convention on the Conservation of Migratory Species of Wild Animals, 1979

African Convention on the Conservation of Nature and Natural Resources, 1968

Convention on Conservation of Nature in the South Pacific, 1976

Convention for the Protection of the Mediterranean Sea against Pollution, 1976

7/ Possible applications of the relevant aspects of biotechnology for the enhancement and sustainable utilization of genetic resources might include techniques for the following (UNEP/Bio.Div/SWGB.1/3):

(a) Crop production and forestry, such as cell and tissue culture, including the rapid propagation of useful micro-organisms and plant species; new diagnostics for plant diseases; detection of foreign chemicals, such as pesticides, in food; genetic engineering of plants to introduce new traits; and new genetic mapping techniques for plant breeding programmes;

(b) Livestock production such as growth hormones for cattle and pigs; the production of diagnostic and therapeutic agents; and sexing, cloning and transfer of embryos;

(c) Aquaculture, such as growth-rate modifications; and manipulations of shellfish and crustaceans.

8/ Possible applications of the relevant aspects of biotechnology for the conservation of biodiversity might include techniques for the following (UNEP/Bio.Div/SWGB.1/3):

(a) Ex-situ conservation, such as the preservation of genetic material in botanical gardens, seed banks, and insectaria; captive propagation of animal species to improve pest or disease resistance; tissue culture for plants; embryo transfer in animals; cryopreservation of embryos or germ tissue;

(b) In-situ conservation, such as "restriction fragment length polymorphisms" analysis (RFLP) to distinguish unique populations of threatened organisms from those less rare or endangered; and other DNA analysis techniques to identify previously undescribed species.